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10/718,641	11/24/2003	Hiroshi Fukuhara	F58-159665M/MTV	1197

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EXAMINER

LEUNG, JENNIFER A

ART UNIT	PAPER NUMBER
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1764

MAIL DATE	DELIVERY MODE
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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/718,641

Applicant(s)

FUKUHARA, HIROSHI

Examiner

Jennifer A. Leung

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 May 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 10 and 12-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10 and 12-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)):

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Response to Amendment*

1. Applicant's amendment submitted on May 7, 2007 has been received and carefully considered. The changes made to the specification are acceptable. Claims 1-9 and 11 are cancelled. Claims 10 and 12-21 are under consideration.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 10, 12-16 and 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barbe (FR 2 722 114) in view of Matsubara (JP 2001-314727) and Yamaji et al. (US 4,230,595).

Regarding claims 10 and 12-16, Barbe (see FIG. 1 and machine translation) discloses an apparatus comprising: a compressor **1** for generating compressed air; a heat exchanger **7** for heating the compressed air; and a hollow fiber membrane **9** through which the heated compressed air is passed. Barbe, however, is silent as to the provision of a deoxidizing chamber, downstream of the hollow fiber membrane **9**.

Matsubara (FIG. 1-3; machine translation) teaches a deoxidizing chamber **11** containing an easily oxidizable ingredient **17**, such as iron powder (see Abstract, section [0018]). The deoxidizing chamber **11** comprises an inlet **12** from which an oxygen containing inert gas is supplied, and an outlet **13** from which the deoxidized inert gas is led out. The deoxidizing

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chamber 11 may be used in combination with conventionally known apparatuses for removing oxygen from nitrogen gas, such as hollow fiber membranes (see section [0024]). Matsubara further illustrates a suitable configuration wherein the deoxidizing chamber 11 is provided downstream of a hollow fiber membrane 33 (see FIG. 3).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide the deoxidizing chamber, containing iron powder, as taught by Matsubara at a location downstream from the hollow fiber membrane 9 in the apparatus of Barbe, on the basis of suitability for the intended use thereof, because the deoxidizing chamber further reduces the oxygen content of the nitrogen gas to thereby produce a nitrogen gas of an even higher purity, when used in combination with the prior art nitrogen purification apparatuses, as taught by Matsubara (see section [0028]).

In view of the newly added limitations, the collective teaching of Barbe and Matsubara is silent as to the easily oxidizable ingredient within the deoxidizing chamber comprising iron powder as well as a catalyst (i.e., sodium chloride), water, and a moisture retaining material.

Yamaji et al. teaches a deoxygenating composition consisting essentially of iron powder (see, e.g., column 3, line 61 to column 4, line 28); a catalyst comprising sodium chloride (see, e.g., column 6, lines 16-54); water (see, e.g., column 2, lines 9-11; also, water in the form of a hydrate, see column 4, line 29 to column 6, line 4) and a moisture retaining material (i.e., of the filler, see, e.g., column 6, line 55 to column 7, line 65).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the deoxygenating composition of Yamaji et al. for the easily oxidizable ingredient in the modified apparatus of Barbe, on the basis of suitability for the intended use and

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absent a showing of unexpected results thereof, because the Yamaji composition contains a catalyst that allows for the oxidation reaction of metallic iron to be activated to a greater degree, and to proceed more rapidly to a greater extent (see, e.g., column 3, lines 22-33). Also, the Yamaji et al. composition inherently possesses very good ability to scavenge or capture oxygen, and is thereby suitable for producing easily and conveniently an oxygen-free atmosphere or an atmosphere containing a much reduced amount of oxygen (see, e.g., column 12, lines 32-40). In any event, the substitution of known equivalent structures (i.e., one known deoxygenating composition for another known deoxygenating composition) involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958), and when the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result, *KSR International Co. v. Teleflex Inc.*, 550 U.S. --, 82 USPQ2d 1385 (2007).

Regarding claims 10, 18 and 21, Barbe (see FIG. 1 and machine translation) discloses an apparatus comprising: a compressor 1 generating compressed air; and a nitrogen gas generator (i.e., PSA absorbers A,B), wherein the nitrogen gas generator comprises a first oxygen absorbing tank A; a first throttle valve, operable to adjust a flow rate of the compressed air passing through the first absorbing tank A (i.e., see valves, drawn but not labeled, surrounding tank A in FIG. 1); a second oxygen absorbing tank B; and a second throttle valve, operable to adjust a flow rate of the compressed air passing through the second oxygen absorbing tank B (i.e., see valves, illustrated but not labeled, surrounding tank B in FIG. 1). Barbe, however, is silent as to the provision of a deoxidizing chamber, downstream of the nitrogen generator A, B.

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Matsubara (FIG. 1-3; machine translation) teaches a deoxidizing chamber **11** containing an easily oxidizable ingredient **17**, such as iron powder (see Abstract, section [0018]). The deoxidizing chamber **11** comprises an inlet **12** from which an oxygen containing inert gas is supplied, and an outlet **13** from which the deoxidized inert gas is led out. The deoxidizing chamber **11** may be added in combination with and downstream from conventionally known apparatuses for removing oxygen from a nitrogen stream, such as an apparatus employing PSA (see section [0024]).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide the deoxidizing chamber, containing iron powder, as taught by Matsubara at a location downstream from the nitrogen gas generator **A,B** in the apparatus of Barbe, on the basis of suitability for the intended use thereof, because the deoxidizing chamber further reduces the oxygen content of the nitrogen gas to thereby produce a nitrogen gas of an even higher purity, when used in combination with the prior art nitrogen purification apparatuses, as taught by Matsubara (see section [0028]).

In view of the newly added limitations, the collective teaching of Barbe and Matsubara is silent as to the easily oxidizable ingredient within the deoxidizing chamber containing iron powder, as well as a catalyst (e.g., sodium chloride), water and a moisture retaining material.

Yamaji et al. teaches a deoxygenating composition consisting essentially of an iron powder (see, e.g., column 3, line 61 to column 4, line 28); a catalyst comprising sodium chloride (see, e.g., column 6, lines 16-54); water (see, e.g., column 2, lines 9-11; also, water in the form of a hydrate, see column 4, line 29 to column 6, line 4) and a moisture retaining material (i.e., in the filler, see, e.g., column 6, line 55 to column 7, line 65).

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It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the deoxygenating composition of Yamaji et al. for the easily oxidizable ingredient in the modified apparatus of Barbe, on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because the Yamaji composition contains a catalyst that allows for the oxidation reaction of metallic iron to be activated to a greater degree, and to proceed more rapidly to a greater extent (see, e.g., column 3, lines 22-33). Also, the Yamaji et al. composition inherently possesses very good ability to scavenge or capture oxygen, and is thereby suitable for producing easily and conveniently an oxygen-free atmosphere or an atmosphere containing a much reduced amount of oxygen (see, e.g., column 12, lines 32-40). In any event, the substitution of known equivalent structures (i.e., one known deoxygenating composition for another known deoxygenating composition) involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958), and when the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result, *KSR International Co. v. Teleflex Inc.*, 550 U.S. --, 82 USPQ2d 1385 (2007).

Regarding claim 19, Barbe further discloses a throttle valve (i.e., valve 19; FIG. 1), arranged at an immediate downstream of the hollow fiber membrane 9, operable to adjust a flow rate of the compressed air passing through the hollow fiber membrane 9.

Regarding claim 20, Barbe further discloses a filter (e.g., filters 3, 5; FIG. 1).

3. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Barbe (FR 2 722 114) in view of Matsubara (JP 2001-314727) and Yamaji et al. (US 4,230,595), as applied to

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claims 10 and 15 above, and further in view of Caskey et al. (US 4,929,259).

Barbe is silent as to the hollow fiber membrane 9 being comprised of polyimide. Caskey et al. teaches a hollow fiber membrane 10 (FIG. 1; column 12, lines 39-48), wherein it is preferable to use a membrane comprised of, for example, a polyimide, in the separation of gases (See column 4, lines 22-62; specifically, column 4, lines 49-53. See also column 3, lines 40-43 for examples of gases). It would have been obvious for one of ordinary skill in the art at the time the invention was made to select a polyimide hollow fiber membrane for the hollow fiber membrane 9 in the modified apparatus of Barbe, on the basis of suitability for the intended use thereof, because the use of polyimide hollow fiber membranes is preferred for the separation of gases, such as oxygen from nitrogen, as taught by Caskey et al.

#### *Response to Arguments*

4. Applicant's arguments with respect to claims 10 and 12-21 have been considered but are moot in view of the new ground(s) of rejection necessitated by the amendments to the claims, which call for the positive recitation of the various materials (i.e., iron powder, catalyst, water and moisture retaining material) to be *contained* within the deoxidizing chamber.

#### *Conclusion*

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after



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the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


\* \* \*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
Jennifer A. Leung  
July 30, 2007

  
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